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# BRITISH ADMINISTRATION AND IRRIGATION IN EGYPT

IT was no Machiavellian policy but the logic of fate that two and twenty years ago established British power in Egypt. The position of Egypt on the high road to India, the maritime supremacy of Great Britain and her large interests in the country had long, it is true, pointed her out as the natural protecting power; but any such policy of interference was wholly distasteful to her rulers. When towards the close of Ismail's reckless and extravagant reign it became evident that foreign intervention was inevitable, they wished to persuade France to undertake the task. The revolt of Arabi and the massacres at Tanteh and Alexandria finally brought about a military occupation. France, not liking the prospect, had withdrawn. The battle of Tel-el-Kebir was followed by the occupation of Cairo, and amid a chorus of protests from her statesmen that the occupation was of a purely temporary character, Great Britain entered upon her task of regeneration in Egypt.

The protests were genuine enough. The British government hoped that a few months would suffice to restore order, set up a decent semblance of native government and withdraw. The state of Egypt was a byword for hopelessness. She was saddled with a debt of over £100,000,000, for most of which there was nothing to show. Her credit was gone; oppression and misrule were universal; life and property were insecure; justice was only another name for extortion and cruelty; extravagant and wasteful traditions were the rule in every department; the agriculture on which the country depended was maintained only by a hideous system of slavery; the whole fabric of government rotten to the core, lay shattered in a thousand pieces. Only the tax-collector and the usurer, working hand in hand, throve and flourished exceedingly; the whole nation, after its brief spasm of rebellion, had fallen back into the apathy of despair. In addition to all this the seeds sown during so many years of misrule in the Soudan were bearing their deadly fruit. The Mahdi's rebellion was in full blast; the Egyptian armies, hopeless and disorganized, were being scattered like chaff, and the furious horde of fanatical dervishes were already knocking at the gates of Egypt itself. The problem of administration was far from enticing, but the darker the prospect the more impossible it was to lay aside the responsibility once undertaken.

Unhappily the assumption of responsibility was not accompanied by full freedom of action. The very fact that her occupation was supposed to be merely temporary added immensely to Great Britain's difficulties. Reformers in a country like Egypt are bound to be unpopular at first. Opposition was safe and easy, and an obvious passport to the favor of any future government. The nations of Europe, and especially France, whose influence in Egypt had been paramount since the days of Napoleon, however willing they had been to allow England to enter the hornet's nest single-handed, were very jealous of the fruits of victory. A direct protectorate was impossible, and without it authority could only be exercised indirectly. Without it, too, Egypt remained a part of the Turkish empire, and thereby the system of the capitulations remained in full force. These treaties, concluded in the hey-day of Turkish power, were originally the outcome of the contemptuous indifference of the sultans towards the infidels within their borders. The despised Franks might settle their own paltry affairs among themselves; they were too insignificant to occupy the attention of the true believer. But as the Turks declined and European nations prospered in power and influence, this contemptuous toleration became a valuable privilege. The practical exemption of foreigners from the jurisdiction of the native courts and from national taxation has always been and still is one of the greatest thorns in the side of Egyptian administration. In addition to this, the international constitution of the *caisse de la dette*, of the railway board and other departments gave the rulers of Egypt only a divided sovereignty in their own house. The precautions laid down to secure the interests of the foreign bond-holders tied Egypt hand and foot in matters financial; and as reform usually means some expenditure in the first instance, they afforded a ready handle for those who desired, from various motives, to render the task of England difficult if not impossible.

It was no wonder that the British government, alarmed by the already heavy burden of empire, shrank from these new duties and made every effort to redeem its pledges of evacuation. It is a matter of history how even in 1887 Lord Salisbury's government (for the policy of evacuation was not the monopoly of any one party) concluded a convention with Turkey's representative to withdraw in three years' time. The sultan at the last moment, acting under pressure from certain European powers, refused to ratify the convention. Diplomacy is often blind enough, and it was thought, eighteen years ago, that three years was too long a period to concede for the maintenance of the British occupation.

While the head doubted and wavered, as has so often happened before in our history, the hands and feet, that is the men on the spot, acted surely and soundly. The British representative in Egypt was then and still is Sir Evelyn Baring, now Lord Cromer. No happier choice could have been made. By heredity a financier, by training a soldier and by nature a statesman, he had already had official experience in Egypt and had also served as financial member of the council in India, that great nursery and school of administrators to which we owe so much. Success has given him a weight and authority with his countrymen which he did not then enjoy, but then as now he possessed all the essential qualities of statesmanship. To a clear-sighted comprehension of all the facts and a wise judgment he added an unflinching resolution and an admirable patience. His sound common sense was happily blended with imagination. In pursuit of distant ideals he never lost his grip upon the practical, and while he always preferred success in obtaining a small reform to failure in a large one, he never lost sight of the essential outlines of policy. Always ready to listen to new facts, he was free from that common failing of great men, prejudice in favor of his own opinion. Himself an indefatigable worker, he knew how to choose and trust his subordinates. Besides these great qualities he had a most felicitous gift of expression in writing, and those who have heard one of his rare speeches are aware that he would have made a great figure in any deliberative assembly. Such was the man whose life task it became to shape the destinies of Egypt.

As soon as the new government had settled a little into its seat, it entered into negotiations with the view of raising a loan of a million pounds. For a country already burdened by an enormous debt and face to face with bankruptcy this was a bold and startling step, but it proved that those in power had a sure insight into the necessities of the situation. The million was known as "the irrigation million," and it was to be expended entirely on reproductive works to improve the water supply of the country. In Egypt the first principle of government is the care of the Nile; the great river is the source and giver of all life. In the words of Herodotus, Egypt is the gift of the Nile; the Nile is Egypt and Egypt is the Nile. Without a proper supply and distribution of the life-giving water, the magnificent alluvial soil and the certain climate are of no more value than the sands of the desert. Egypt is a purely agricultural country; its agriculture depends entirely upon its irrigation. No administration unless based upon a sound system of irrigation would be worth more than waste-paper. To build up such a system was rightly perceived to be of the first importance.

Nature had provided Egypt with a simple and easy method of irrigation. Everybody knows the main characteristics of the flow of the Nile and its annual flood. The flood, which is principally due to the torrential rains of Abyssinia, sweeps down the Blue Nile and the Akbara, carrying with it the fertilizing silt from the virgin forests and volcanic soil, and, swelled by the volume of the White Nile, reaches Egypt about the end of July. In a year of good flood the amount of so-called "red" water passing Assouan in August is as much as 14,000 cubic metres per second. All through the winter the Nile, though falling, has still a good supply, but in the summer months the difference is extraordinary. Towards the end of May in an average year the volume of water at Assouan is only about four hundred cubic metres per second, while in a bad year it falls to half that amount. That the flow is maintained even to this extent is principally due to the steady supply drawn by the White Nile from those great natural reservoirs, the Sudd country and the equatorial lakes: for the contribution of the Blue Nile falls to very little and the Akbara ceases to flow at all. From time immemorial the whole land of Egypt had been divided by dikes into basins or series of basins varying from 5,000 to 15,000 acres in extent. About August 12 the muddy flood was led by means of short shallow canals into these basins. There it stood for forty days, till it had deposited its burden of silt, and then it was drained off again as the flood fell. Thus every year the soil was renewed; the land was thoroughly washed and cleansed from injurious salts. On the wet soil the husbandman sowed his seed, and the hot sun brought the crop quickly to maturity without further trouble and with the certainty of good harvest weather. The only anxieties were lest the flood should be too low to cover all the land, or lest it should be so high as to prevent the water being drained off at the proper time or even to break through the dikes and sweep away the mud-built villages. In Roman times, before the Mohammedan invasion A. D. 700, the whole of Egypt (6,250,000 acres) was cultivated in this way; but, during the centuries of misrule that followed, as the population decreased, the basins in the northern part of the Delta were allowed to fall into decay; the land became waste and salted; and when Mehemet Ali came as viceroy in 1810 only about half the Delta was cultivated.

To Mehemet Ali is due the great change in the system of irrigation. He was struck with the profits that might be made from the cultivation of sugar and cotton. But these crops need continuous watering; they will not stand complete inundation. He strengthened the dikes that kept out the flood and dug deep canals that would be capable of carrying water from the Nile at even its lowest levels in the summer. The advantages of the new system were obvious enough. With a continuous supply of water all the year round, two or even three crops could be raised instead of one, and those of a very valuable character. But the disadvantages were also great. The land was deprived of its annual washing as well as of the deposit of fertilizing silt, and the whole scheme of agriculture was altered. The perennial irrigator was the wealthier man, but his anxieties were also greater. He needed a regular supply of water just when the Nile was lowest; any failure meant the loss of weeks of labor and wasted expenditure. Under basin irrigation a failure of the flood meant that so much land would go uncultivated, but no time or money was spent upon it. What was of greater significance was that irrigation became a far more complicated and difficult science. Highly skilled experts were necessary to regulate and apportion the water supply; only a department of government itself could undertake to reconcile conflicting claims when the water supply was scanty. The Egyptian farmer had to look more and more to government, as other farmers look to Providence. Basin irrigation was a rough-and-ready system founded on nature itself, but the delicate network of deep canals necessary to distribute the water in the summer was very liable to fall into disorder. Under the basin system a failure of the year's flood only meant that the land lay fallow for a time, but a failure of perennial irrrigation meant a permanent disaster.

It is a maxim of perennial irrigation all the world over that when water is scarce its distribution must be managed with skill and also with equal but despotic justice. The Egyptians soon found that they had gained but little from the change. The ministers of Mehemet Ali did not carry out his great ideas with the skill and justice which they demanded for success. Not only were the deep-level canals faulty in slope and alignment, but they were often constructed with more regard for the interests of particular landowners than for those of the country at large. They speedily silted up and had to be annually cleared with enormous trouble. The whole burden of this fell upon the wretched peasantry. It had always been the custom to call out the fellaheen to guard the dikes in the flood time, and the employment of this forced labor, under the name of the corvée, had always been one of the privileges of the government. But now the troubles of the peasants were multiplied a thousandfold. Not only had they to dig the deep canals in the first instance, but they had to clear them of silt. Unpaid, unfed, and unprovided with tools, the year was too short for the labors they had to perform. A few powerful proprietors flourished and throve, but the mass of the people, torn from their homes just when their services were most needed there, fell more and more into an abject and miserable slavery. The Khedive Ismail made things even worse. Under him the corvée was called out to dig the Suez canal, and he used the same instrument to construct, in upper Egypt, the great Ibrahimiyah canal, which was designed to give perennial irrigation to his own private estates, most of which had been amassed by despotic methods at the expense of the small proprietors.

The French engineers employed by Mehemet Ali perceived that if the river level could be artificially increased during the summer, it would effect an immense saving of labor in clearing the canals; and with this object they devised the barrage at the point of the Delta to hold up the river. But Mehemet, with all the forced labor at his command, and with his head full of many grandiose ideas, was only fitfully keen about the project, and it was still unfinished at his death in 1848. Not until 1872 was it possible to make any use of the structure, and then only of that portion of it which lies on the Rosetta or western branch of the Nile. As for that on the Damietta branch, no one dared to think of using it at all. At the time of the English occupation the Rosetta barrage managed to hold up one metre of water. Even this had increased the area of summer crops matured from 250,000 acres to 600,000. But so faulty was the work that it was felt it might give way at any moment, and it was the settled policy of the government to rely instead on huge and costly pumping-stations. It was a paltry result for the expenditure of £4,000,000 and so much labor.

Then, not for the first or last time, the Anglo-Indians came to the rescue of Africa. Sir Evelyn Baring summoned from India Colin Scott-Moncreiff with a trusty band of lieutenants, Garstin, Willcocks, Ross, Brown, Foster, Western and Reid. All these men, trained in the great school of Indian irrigation, were possessed of the highest scientific knowledge and skill, but they were also animated by a spirit which was better than science. Deep in them lay the earnest wish and determination, far stronger even than their enthusiasm and love for their profession, to alleviate the lot of the unhappy peasantry of Egypt. It was this heartfelt sympathy for the wrongs of the fellaheen, ground down by the intolerable burden of the corvée, that sustained them in their ceaseless labors and enabled them to pass successfully through those dark days, when the air was full of forebodings of failure and disaster, whose fulfilment would have been so agreeable to many of their critics.

The barrage was the kernel of the situation. It would have been much easier to rebuild it completely, but in the bankrupt state of the country this was not to be thought of. The cotton crop had to be supplied while the repairs were going forward; when the flood came down all operations were necessarily at an end. Mr. Willcocks was placed in charge of the work. By a succession of ingenious devices, too numerous to mention here in detail, he succeeded in mending and patching the barrage to such an extent that in 1884 two and two-tenths metres were held up on the Rosetta branch and one metre on the Damietta branch. Next year the same nursing process was continued; three metres were held up on the Rosetta and one and six-tenths on the Damietta branch. Not only was the summer water supply on the Delta canals greatly increased, but it was delivered at a higher level with a great saving of expense in lifting it on to the land. The acreage under summer cultivation rose at a bound from 600,000 acres to 1,200,000. All Egypt stood amazed; for the first time the common people gratefully realized that a new power had come among them. But temporary expedients cannot last forever. The greater the area of summer cultivation, the greater the need for certainty in the action of the barrage. Mr. Willcocks's success sealed the claim of the barrage to a share in the "irrigation million," and during the next four years extensive and permanent repairs were carried out.

The great problem of the barrage was that, with the exception of the revetment wall running across the tongue of land which divides the two branches of the river, both sections of it were built on the shifting sands of the river-bed, which afforded no foot-hold for masonry works. In each case the bed of the river had to be filled up with rough stone-work, and on the top of this, but still under water, a broad platform or floor was laid down reaching from bank to bank. On this foundation rose the bridge of arches containing the sluice-gates, which could be raised or lowered as required. The brick-work of the arches was sound enough, but the underlying floor was very faulty. Section by section it was now laid bare by means of earthen dams and recased in a new and reliable suit of armor. The sluice-gates were also replaced by a new pattern. Each portion of the work had to be finished and made secure before the annual flood came down and put a stop to all operations. By 1889 the repairs were finished; and so successful were they that it was found possible to hold up still another metre, and the area of summer crops matured rose once more to 1,520,000 acres. Both in 1891 and 1892, years of exceptionally low summer supply, the whole available water in the Nile was diverted into the canals, and not a drop reached the sea without having done duty in the fields.

It was clear that the barrage was now equal to all demands that might be made upon it, but the engineers wished to make security doubly secure. Moreover, the prospect of an increased supply by means of an artificial reservoir had become a question of practical politics, and in view of this it was desirable to leave no precaution untaken. In 1886–89 the original platform had been overlaid and strengthened, but its interior was known to be full of cavities of uncertain extent. In 1897–98 an ingenious device was adopted. Five holes were bored in each pier of the barrage, right into the bottom of the structure, and into each hole was poured a quantity of liquid Portland cement till it would take no more. Portland cement has the remarkable property of solidifying under the action of water into a substance whose hardness and resisting power are enormous. The cement thus introduced penetrated into every hollow and cavity of the foundation and welded the whole into a solid mass. How much this invigorating tonic was needed was shown by the fact that the Rosetta barrage alone swallowed 3,254 barrels of the mixture. Finally, downstream of each section of the barrage a solid dam was laid down, blocking the course of the stream up to such a height that the difference between the upstream and downstream level of the barrage when the gates were closed was reduced from four metres to two and a half. This had the effect of immensely reducing the pressure on the barrage itself without impeding the river in flood, which could pass freely over the top of these dams or weirs. The sluice-gates were at the same time heightened, so that altogether the combined works can hold up five metres of water.

The work of the irrigation department in the Delta was by no means confined to the barrage itself. By degrees the whole system of canals was remodeled and above all, an immense number of new drains were laid out, for when water is delivered at a high level it is only less important to get the water off the land than to get it on, in order to avoid waterlogging and salting. With these improvements the economic results of the restored barrage was extraordinary. For the moment one instance will suffice. Up till 1900 the summer supply of 1878 had been the lowest on record. It is still remembered in Egypt as a year of black disaster. The river level at Assouan sank to 71 centimetres below zero on the gauge. But in May, 1900, on three separate days the gauge recorded a level of 98 centimetres below zero. Yet, in spite of this, so perfect was the system that it was found possible not only to save the crop, but also to secure a yield which a few years earlier would have seemed a miracle. Stringent regulations had of course to be laid down as to the use of the water, and a special staff was appointed to see that they were carried out. It speaks well for the good sense of the Egyptians, and it proves their implicit faith in the British engineers, that these regulations were carried out practically to the letter. The cotton crop amounted to 2,250,000 kantars (the kantar equals 100 lbs. nearly), and the maize crop was also very good; only the rice, an insignificant item, was sacrificed. Thus no loss was experienced either publicly or privately in a year of unprecedentedly low water, although the cotton was considerably damaged by most unseasonable weather in September.

Meantime great events had been in progress elsewhere. (In Egypt all really great events are connected with the Nile.) By 1889 the improved barrage, as well as other minor works undertaken in the Delta and also in Upper Egypt, had put the country in a very much more satisfactory financial condition, and more money was available for reproductive expenditure. The immense gain to the country from a system of perennial irrigation in skilful hands was firmly established. Every year the area of cultivated land in the Delta pushed steadily northwards, while in Upper Egypt the lands about the Ibrahimiyah canal and in the Fayoum, already perennially irrigated, loudly demanded a larger supply, and the proprietors of the basin lands began to hope for conversion to the more profitable if more troublesome double-crop system. But the natural summer supply of water did not expand with these increased demands. In bad years, as we have seen, every drop of water in the Nile was already used up. The need for a reservoir which should store up some of the surplus water of the flood or winter months for use in the summer became more and more urgent. The idea of a reservoir had long floated before the minds of the rulers of Egypt. The success of the Delta barrage first made it a question of practical politics. There were three problems to be faced: (1) Where could such a reservoir be constructed? (2) What arrangements could be made to avoid the danger of huge silt deposits, which would soon seriously diminish its capacity? (3) Supposing that the difficulties of site and design were settled, where was the money to be found? It had gradually come to be recognized that the river-bed itself was the best place for storing the water by means of a dam. In 1890 the government took the matter seriously in hand, and charged Mr. Willcocks with the task of examining the river north of Wadi Halfa, reporting upon the best available site for the dam and preparing a design for it. Mr. Willcocks completed his survey and design in 1894, and after considerable discussion and examination by an international commission, his plans, with some small modifications, were adopted.

As all the world knows, the Assouan site was the one selected. There is at this point an extensive outcrop of granite running clear across the valley of the Nile, which it was thought would give sound rock everywhere at a very convenient level for the foundations of the dam. Everywhere else the shifting sands of the river-bed precluded the possibility of laying foundations solid enough to hold up a great head of water. Moreover, the trough of the river above the cataract at Assouan and a long way south of it is exceptionally deep and thus affords an unrivaled opportunity for storage. Mr. Wilcocks's bold design solved the second of the difficulties. Other great dams are solid throughout and are planned so that the rising flood may pass freely over them. But in view of the immense burden of silt carried by the Nile in flood, which the least impediment to its course causes it to deposit, this plan could not be used. The Assouan dam is of a completely new type. Its principle is that the flood water shall pass, not over it, but through it. To this end it is pierced by 180 openings, which are like tunnels in the huge mass of masonry, controlled by powerful sliding gates worked from above. During the flood the whole of the red water passes freely through; every sluice-gate is opened, and the rush of the gigantic mass of water, amounting it must be remembered to at least 10,000 cubic metres of water per second for weeks together, acts like a huge broom, completely sweeping out the floor of the reservoir and securing it against any deposit of silt. Later in the year, about the end of November, when the flood has subsided and very much less matter is carried in suspension, the sluice-gates begin to be gradually closed, and by the end of February or the beginning of March the reservoir is full, without the normal discharge of the river having been affected in any appreciable degree. From April to July the water thus stored up is let out for use further down the river according to the requirements of the season, till by the time the flood is due every sluice-gate is once more up and ready to give passage to the rising stream.

Site and design once settled, the financial difficulty remained. Many tedious negotiations took place, and it was not until 1898 that Lord Cromer succeeded, with the aid of a great financial house, in reaching a satisfactory arrangement. No time was lost, and as soon as the flood of 1898 began to subside the contractors were busy with the foundations of the dam. A succession of low Niles gave unusual facilities for the work, and everything was completed before the flood of 1902. From an engineering point of view the construction of the dam was only remarkable for its size; compared with the difficulty of building a barrage on the shifting sands it was a plain and straightforward business enough; but the fact that the rock on which the foundations were laid proved to be rotten in some places to a depth of forty feet added a great deal to the anxieties of the work, though eventually to its strength. The army employed averaged 10,000 men, including 800 skilled Italian stonecutters. The dam itself contains 780,000 cubic yards of masonry (granite and Portland cement), an amount equal to about one-third of the Great Pyramid at Gizeh. It is about one mile and a quarter in length; its height at the deepest point is one hundred and twenty-six feet; its width at the bottom corresponds to its height. When all the gates are closed, sixty-five feet of water are held up. This means that 1,200,000 cubic metres of water are stored up, about the same amount that passes by Assouan in a single day of the flood. The effect on the river is felt as far up as Korosko, one hundred and forty miles to the south.

The Assouan dam is simply a device for storing the water and letting it out for use in Egypt at the proper time. It was necessary, therefore, to supplement it by other works to distribute the extra supply further down the river. Accordingly two new barrages were taken in hand at the same time. The most important of these was the Assiout barrage, just down stream of the head of the Ibrahimiyah canal, destined to perform the same function for middle Egypt and the Fayoum that the old barrage performs for the delta. In principle the Assiout barrage is exactly similar to the other, and the difficulties of construction were precisely the same. In both cases the foundations had to be laid on the shifting sands, and as each section of the work was undertaken a portion of the river had to be diverted from its course by means of temporary earthen dams. There was call for the highest exercise of engineering skill; but thanks to the experience gained in dealing with the imperfections of the earlier barrage, the Egyptian engineers were easily able to encounter all difficulties successfully. The platform of solid granite and cement, set at a suitable depth below the bed of the river, is ten feet thick and eighty-seven feet wide. As a further precaution against the undermining action of the water, there are also below the platform two continuous lines of iron sheet-piles with hermetically sealed joints. Besides this, the extra supply available for the Delta necessitated the building of yet another barrage on the Damietta branch of the Nile at Zifta, half way between the point of the Delta and the sea. As the area of the cultivated land spread constantly northwards by means of fresh reclamations, it became apparent that the canal system taking off above the original barrage was too long to admit of the water in times of pressure reaching the northernmost parts. By means of the Zifta barrage the water apportioned to the north has no longer to reach its destination through the network of canals but is passed directly down the river channel, and is thus speedily and effectively distributed into the new series of canals, so that the irrigation of the new lands and still further reclamation go steadily forward. It is unnecessary to describe this barrage in detail. Its principle is the same as that of the others. Indeed, barrage-building seems to have become a mere routine detail of the irrigation department, to be taken as an ordinary part of the day's work.

The dam and the two new barrages cost between them some £3,500,000, a truly insignificant sum when their great results are considered. It will take some years before the full effects are felt; waste lands cannot be reclaimed nor basin lands converted to perennial irrigation in a day. But eventually it is calculated that the extra supply of water will enable 52,000 acres to be reclaimed to cultivation in the Fayoum and 120,000 in the Delta, and 764,000 acres of basin lands converted to perennial irrigation in the whole of upper Egypt. It is a very conservative estimate that conversion to perennial irrigation is worth an extra yield of £2 annually and that reclaimed land produces an annual yield valued at £5. On this basis the annual gain to the country will be nearly £2,000,000, while the direct gain to the state exchequer in rentals and taxation will be £378,000. Even the lands already enjoying perennial irrigation reap an immense benefit from the reservoir. In the years immediately preceding its completion, the area under cotton had been greatly extended and the annual crop had reached a total of 6,000,000 kantars, worth at the comparatively low price of 175 piastres (the piastre equals 2½ d.) about £10,000,000. Cotton is a hardy plant and can retain its vitality for a certain period with a very irregular supply of water. The cultivators had taken advantage of this quality to the utmost and had put everything into cotton, leaving no margin. A really bad year would have meant the loss of at least one-tenth of this value; and against such a loss, which might have come once in five years, they are absolutely assured by the Assouan reservoir. The value to the cultivator of absolute certainty.and freedom from anxiety on this point is beyond calculation.

It is, however, unnecessary to indulge in prophecy as to the value of the new works, for it has already been proved by actual experience. On August 15, 1902 (the usual date for letting the flood water into the basins), the flood was exceptionally low, and it was feared that a large amount of land would have to remain dry. The Assiout barrage was then just completed. Full of confidence in their work, the engineers decided on a bold stroke and actually closed the gates in the face of the flood. The barrage easily stood the strain; the water level of the canals rose one and a half metres, an increase which was more than enough to avert the threatened disaster. The money value of the crops thus saved was estimated at not less than £600,000, while the whole cost of this barrage, including the works on the Ibrahimiyah canal, was only £875,000. Thus in the first few months of its existence the barrage nearly repaid its cost, and that too by a side wind, for its original purpose was to hold up the river in the low summer season and not in the flood. Again in May, 1903, the discharge of the river at Assouan sank to 200 cubic metres per second. By means of the reservoir this amount was actually doubled all through the low season immediately preceding the flood. At the lowest computation the reservoir thus saved the country nearly two million pounds in the first year of its existence. At the great exhibition at St. Louis last year there was to be seen a large-scale model of eight miles of the Nile valley in the neighborhood of Minieh from the desert on the one side to the desert on the other. It is an admirable demonstration of all the forms of irrigation at present in use in Egypt. First there is the Nile itself with its high *berm* or bank; then the perennially irrigated lands about the Ibrahimiyah canal, dating from the time of Ismail; then the lands most lately converted to perennial irrigation on the most approved modern methods by Sir W. Garstin, in anticipation of the increased summer supply from the reservoir; then the Bahr Yusuf canal which feeds the Fayoum; and lastly, bordering on the desert, the remaining basin lands. These last will probably never be converted. They contain the poorest soil and stand in great need of the annual inundation, and they also form a great fortification against the sands of the western desert, which under the influence of the prevailing west winds have a strong tendency to encroach on the cultivated ground.

It would be easy to quote a multitude of figures to prove the marvelous increase of material prosperity which has resulted from scientific irrigation. Whether we look at returns of revenue, of exports and imports, of railway traffic, or the numerous other indications by which the prosperity of a nation is gauged in figures, we find the same story of expansion. The national debt is being steadily diminished, and instead of verging on bankruptcy the country suffers from having to buy back its own stock at a premium in spite of reductions in the rate of interest. Nor is all this appearance of prosperity delusive. The wealth of the country is not monopolized by a few individuals owning huge estates, while the mass of the population are sunk in poverty and slavery. Great as are the sums which have been spent upon the essential irrigation works out of annual revenue, they have not been wrung from the people by oppressive exaction. Irrigation has been the first great principle of British administration, but hand in hand with it has gone the principle of low taxation. Year by year there has been some remission, some lightening of the burden. And this is the more remarkable, because until 1899 Egypt had upon her hands a troublesome war, and since then has had to bear the greater part of the cost of the administration of the Soudan.

No better proof of the genuine prosperity of the mass of the people can be given than the fact that Egypt is a land of small proprietors. The number of land-tax payers is returned as 1,026,081. Of this number 96 per cent own twenty feddans (the feddan equals nearly one acre) or less, 85 per cent own five feddans or less, while 80 per cent own as little as two feddans or less. Of the whole soil of Egypt it is calculated that more than one-half is owned by proprietors of 50 feddans and under. Probably few countries in the world can show so large a proportion of small proprietors, and the proportion is steadily rising. In the early eighties, before the British occupation, the tendency was all in the opposite direction, though it is difficult to obtain any exact figures. Not only was the taxation very heavy, but it was also collected at times most inconvenient to the agriculturists, a grievance of hardly less importance. The tax-collector and the usurer worked hand in hand. The demands of the first drove the people into the toils of the other, and yet, owing to the universal corruption of the government officials, supported by the custom and tradition of centuries, the state reaped but little benefit. The indebtedness of the fellaheen to the rapacious Greek or Coptic money-lenders was enormous and grew from year to year; if the process had been allowed to continue, most of the land must soon have passed out of the possession of its original owners. Not the least useful of recent measures has been the institution of the Agricultural Bank of Egypt, which, though a private company, was founded and is carried on with the active concurrence and coöperation of the government. Its sole object is to make loans to the fellaheen on the security of their land or crops at reasonable rates of interest. How successful its operations have been is shown by the figures of the bank's report, published at the end of 1903. It had then 78,911 loans outstanding, and the average amount of a loan was £27. Nor are its results to be measured solely by the amount of its loans. Its example and competition has had an extraordinary effect in curbing the extortion of those money-lenders who are still in the field. It is not too much to say that all danger of large accumulations of land in the hands of these usurers at the expense of the peasantry has passed away.

But of all the benefits arising from the British occupation, the one which touches most nearly the happiness of the fellaheen has been the practical abolition of the corvée, at least in its most oppressive form. Forced labor is no longer the instrument by which the Egyptian government carries out all its public works. A sound economy has forbidden that alluring but wasteful expedient. Along with it the kurbash or whip, the traditional instrument of the task-master, has vanished; in modern Egypt it finds no place except in the museum. The days when the Suez canal or the Ibrahimiyeh canal was dug by miserable hordes, laboring under the burning sun, unfed, unclothed and unpaid, torn from their homes just when their services were most required there, are past for ever. No longer are the lives of the fellaheen, like those of the Israelites of old, made "bitter with hard bondage, in mortar and in brick and in all manner of service in the field." Since 1889 all earthwork maintenance has been performed by voluntary and paid labor. In part this result is due to the improvement in the barrage, which by raising the water level enabled the canals to be laid at a better slope so as to avoid the accumulation of silt; in part it was due to the direct action of the government. Every year £400,000 is devoted solely to the clearance of silt and the maintenance of the earthworks. The relief to the peasantry of Egypt cannot be reckoned in millions. The government of course retains the right to call out the corvée in case of national emergency, and every year it is called out to guard the dikes in the flood. But the flood corvée is cheerfully and willingly borne. Every one is equally interested in the protection of the banks. It entails no hardship; no man's post is far from the gates of his own village. Its incidence too has been greatly diminished. From 1888 to 1891 about 50,-

000 men were called out annually; in 1892 the total rose as high as 84,000. But in 1902 the total was only 5,000. As experience accumulates and organization improves, it will probably be found possible to dispense with the corvée altogether, except in the years of very high flood. In 1901, a year of low but not exceptionally low flood, the corvée was not called out at all north of Cairo, for the first time in the history of Egypt. As the basins give way to perennial irrigation, there is naturally a less extent of dikes to be guarded. In any case there is no doubt of the willingness of nearly the whole population to serve when the flood is specially dangerous. At such times the trouble will rather be to prevent the work being hindered by excessive numbers.

From time to time, as the resources of the country allowed, many other reforms have been carried out in every department of the state. The army, the police, prisons, hospitals, railways, not to mention the two great departments of education and justice, have all in their turn and in varying degrees felt the hand of the reformer. Possibly more might have been done had Lord Cromer been willing to import a greater number of Englishmen or Europeans into the service of administration. But this has never been his policy. From the first it has been his view, and he has never wavered in his determination, that it should be one of our prime objects so to educate the Egyptians that, should it ever be necessary or desirable for Great Britain to withdraw from the country, we shall leave behind us a people trained in all the arts of government and thoroughly imbued with the character and spirit without which independent existence as a nation is impossible. With him this profession has been no idle talk. Again and again reforms desirable in themselves have been postponed or abandoned, because they could only be carried out by the substitution of European for Egyptian administrators. Many a time he has had to yield to the pressure of circumstances, but he has always steadily set his face against the undue increase of Englishmen in the service of the Khedive. No Englishmen, for instance, have ever been allowed to hold office as the governors of provinces; and even in the field of irrigation one of the great circles, as the divisions of the country for water administration are called, has always been reserved exclusively for Egyptians. No part of his policy has been more freely criticised, often by those whose sympathies were most bound up in the interests of the land of their adoption, often even by Egyptians themselves. But in spite of many disappointments and failures he has held tenaciously to his purpose. Those who read his annual reports know how anxious he has always been to make the natives understand his aims in this direction. No feature of his administration redounds more to his credit than this eager solicitude for the moral as well as the material regeneration of Egypt.

The latter is comparatively easy to measure. Even the most casual visitor can see it with his eyes. But the former is far more difficult to estimate. Two and twenty years may raise a country from the depths of bankruptcy to the pinnacle of secured wealth and credit; it is but a short period in the history of the development of national character. But here too there are signs of progress. Far the most difficult enemy to combat is the universal corruption, that far-reaching canker which has eaten so deep into the heart of Egypt. For centuries it has been the ingrained rule and habit of the people. As in some countries nothing can be done without a drink, so in Egypt nothing could be done without a bribe. The tax-collector was bribed to collect no more than was his due; the result of litigation depended solely on the comparative wealth of the parties; great men or powerful landowners were bribed to refrain from oppressing their inferiors; a high official could be approached only by filling a multitude of outstretched hands; office of any kind was regarded only as a means of growing rich by illegitimate but recognized extortion. To-day it is beginning to be dimly recognized that officials may have other interests to serve than their own pockets; that judges may decide honestly and uprightly, and not invariably in favor of the longer purse; and that tax-collectors are not to be guided in their demands solely by their own personal greed. These new conceptions of duty, right and justice are making headway, but the old traditions die hard. Many an Egyptian official still secretly takes a bribe to perform his plain duty, even when both bribed and briber know well that he would be instantly dismissed from his office if he did not perform it; so strong is the habit of centuries. There can be little doubt that if the irrigation system were left entirely in the hands of Egyptians, it would be regarded primarily as an extraordinarily potent engine for extracting "baksheesh" from reluctant pockets: no fee, no water, would soon be the rule, with the inevitable result of disorganization and disaster to the whole country. It would be worse than useless to refuse to recognize these facts, but they furnish no reason to despair of the future. After all, bribery and corruption were not invented in Egypt, nor are they solely confined to that country; the tendencies which they represent are present in all countries in a greater or less degree; they are the universal enemies whom the supporters of good government have everywhere to fight. At least things are better than they were. Among the Egyptian peasantry there has come into common use during the last twenty years a proverb which tells its own tale. It runs thus: "The word of an Englishman is better than honorable." The saying is a testimony to past success, but it is also an admonition for the future. We have been fortunate in the men to whose lot the government of Egypt has fallen. Whatever their success has been, and as an Englishman I do not wish to estimate it too highly, it is due to the fact that the interest of those they govern has always been their first consideration. It would be ridiculous to assert that we maintain our position in Egypt from altruistic motives; it would indeed be the worst form of cant. We have gained much from it already and hope to gain more in the future. But our experience there teaches the lesson, which as a nation with wide imperial responsibilities we shall do well to lay to heart, that the best way to advance our own interests is by an exclusive regard to the interests of those we govern.

Nor would it be fair, while reflecting upon the difficulties with which we have had to deal, to avoid all mention of the advantages which we have had upon our side. The fertile soil and the certain climate of Egypt, together with the inestimable benefit of the great river, were magnificent foundations on which to rebuild the prosperity of the country. Least of all can we forget the extraordinary qualities of the fellah. Whatever his faults, and he has his share of them, without his extraordinary industry and power of work, coupled with his heartfelt passion for the soil he tills, the best administration in the world would have fallen far short of the results which we have attained. Lastly we can never forget how much we owe to those French engineers who, in the first half of the last century, by the introduction of the new system of irrigation, the full development of which we have yet to witness, sowed the seed that we and modern Egypt are reaping. It was not their fault that their designs were faultily executed. If they had had behind them the sanction of French bayonets there would have been a very different tale to tell. They had to work through indifferent and incapable or corrupt officials, with no power to enforce their wishes, relying solely on the capricious breezes of despotic favor. The original designer of the Delta barrage was Mougel Bey. When Sir Colin Scott-Moncreiff came to Egypt, he found the poor old man living in obscurity and oblivion, weighed down by poverty and neglect. By his intercession Mougel was rescued from want, granted a pension by the Egyptian government and enabled to spend his remaining years in comfort and honor. In these days, when France and England are once more closely linked by ties of friendship, it is pleasant to recall this graceful and generous recognition of the merits of his predecessor by the chief of the English engineers, at a time when international jealousies were so acute.

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